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THE ESTABLISHMENT OF THE SMELT IN GREAT LAKES WATERS

We have learned this spring that the smelt (*Osmerus mordax*) has become established in some of the waters of the Great Lakes region, and write this note to call attention to the fact. Our first news on the subject was contained in the following account, which appeared in the Detroit Free Press for April 7, 1922.

SPAWNING FISH LURE FRANKFORT FARMERS

Special to the Free Press

Frankfort, Mich., April 6,—Many people from here are driving to Beulah to get some of the myriads of fish that are coming out of Crystal Lake and going up the Cold Creek there to spawn. The Beulah farmers are catching them by the thousands. They haul them home in wagon loads. What they do not eat they use for fertilizer. They catch them with dip nets and many of them use a common burlap sack as a scoop. They are an unknown variety, and look exactly like a herring about the only difference is that they have a row of teeth on their tongues which a herring has not. Specimens have been sent to the state commission to be classified.

The account is doubtless authentic, and the fish referred to is unquestionably *Osmerus mordax*. The planting of 16,400,000 smelt eggs in this Crystal Lake, exactly ten years prior to the date of the news dispatch just quoted, is recorded in the Twentieth

Biennial Report of the State Board of Fish Commissioners of Michigan (1913, p. 107).

On May 15 each of us received from the State Department of Conservation (of Michigan), for identification, a dried specimen of the smelt, from Grand Traverse Bay. The accompanying letters stated that the new fish had appeared in abundance in this Bay, which is a long arm of Lake Michigan. About the same time Dr. John N. Lowe, sent in a similar fish from the same region. These Grand Traverse Bay schools are probably the result of plantings made in waters tributary to the Bay, and recorded in the reports of the U. S. Commissioner of Fisheries for 1915 and 1916, and in the Michigan report referred to above.

The introduction of smelt into the waters of the Great Lakes was apparently due largely to the recommendations and efforts of Seymour Bower, who wrote as follows in 1909.[1]

> A small consignment of smelt eggs from New England waters was received at the Soo hatchery last spring and deposited in the St. Mary's River. This initial effort should be repeated for a number of years; or perhaps a better plan would be to transfer a carload or more of the adult fish from their native waters in New England. It is quite probable that this work would be taken up by the Bureau of Fisheries on application and proper presentation of its potential importance. The introduction of fresh water smelt to serve as a specially desirable source of food supply for the adult salmon and other predaceous but valuable food fish is strongly indicated and recommended.

The subsequent distribution of smelt eggs in Michigan by the Bureau of Fisheries is recorded in the Reports of the U. S. Commissioner of Fisheries for 1909, 1912, 1914, 1915 and 1916.

It appears that the smelt is now well established in Great Lakes waters. Whether it will equal or exceed the hopes of those who have introduced it, or become disastrous to some of the original fisheries,

[1] Seventeenth Biennial Report of the State Board of Fish Commisioners (Michigan) for fiscal years 1905 and 1906 (1909), p. 13.

remains to be seen. To watch the progress of the experiment will be very interesting.

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YOUNG *HEMICARANX* AND FLORIDA *APOGON*.

Hemicaranx amblyrhynchus. Large Hemicaranx are rare, but Mr. L. L. Mowbray has found the young common, swimming under medusæ, and his recent collections contain 8 specimens so taken off Miami Beach, Florida, December 27, 1921, measuring from 22 to 58 mm. in length to base of caudal. They are marked with 5 broad vertical blackish bands, have dorsal, anal and ventral fins blackish, and resemble rather closely three somewhat larger (78 to 86 mm.) specimens of *Hemicaranx marginatus* from Banana, West Africa, August, 1915 (American Museum Congo Expedition). Though notably deeper than the adult of *H. amblyrhynchus,* their fin count (dorsal soft rays 27 to 29, anal 24 to 25) agrees with that species, which they should be, and they are referred to it.

Depth in length (to base of caudal) increases with the size of the specimen from 2.5 (one of 28 mm.) to 2.1 (one of 43 and of 58). Head and eye decrease respectively 2.5 to 3.1 (in length), 3.0 to 3.8 (in head). The curved portion of the lateral line becomes shorter, its chord 1.9 to 2.4 in straight part; and deeper, its depth 3.0 to 2.5 in chord. The reentrance of the caudal, which is only slightly concave in the 22 mm., deepens to moderately forked in the 58 mm. specimen.

Apogon. In twelve specimens of *Apogon* from Miami, Florida, 40 to 63 mm. in standard length (to

base of caudal), all but one, on which the markings have been mostly lost, are readily referable by color, 7 (of 44 to 63 mm.) to *Apogon sellicauda,* Evermann & Marsh, 2 (of 53 to 56 mm.) to *Apogon maculatus,* 2 (of 40 to 47 mm.) to *Apogon binotatus.*

The first have black spot below soft dorsal and dark band across peduncle, the caudal sometimes with a narrow dusky tip. The second have black spot below soft dorsal and on peduncle, soft vertical as well as caudal fins with a narrow blackish tip. The third have dark band between dorsal and anal, and another across caudal peduncle—All have black spot on opercle.

It is impossible to find technical characters to correlate with these color differences. The anal soft rays vary from 8 to 9 in the *sellicauda,* in the *maculatus* are 9, in the *binotatus* 8 and 9. The scale counts vary from 25 to 27 in the *sellicauda, maculatus* (one specimen only) has 26, in *binotatus* both have 25. The *maculatus* are a trifle more slender, depth in length to base of caudal 2.9 1/2 and 3.1, versus 2.6 to 2.8 3/4 in the *sellicauda,* 2.7 2/3 and 2.8 4/7 in the *binotatus.*

If these three are in fact distinct species, and these few specimens representative, *maculatus* would be very slightly more slender and average a fraction of a ray more in the anal, *binotatus* average a scale less in the lateral line. But color is the only good criterion to differentiate them.

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TWO NEW INSULAR BATRACHOSEPS.

Upon examination of large series of *Batrachoseps* in various Museums it has become apparent that the forms inhabiting Santa Catalina Island and Coronados Islands are worthy of recognition.

Batrachoseps leucopus sp. n.

1914 *Batrachoseps attenuatus* Van Denburgh and Slevin, Proc. California Accd. Sci., (4), IV, p. 139.

Type: U. S. Nat. Mus. No. 64319, adult female, collected by A. W. Armstrong, Aug. 4, 1921.

Type locality: Los Coronados, North Island, Lower California.

Diagnosis: A *Batrachoseps* with dark dorsal surface and light sides, 18 to 20 costal grooves, hind leg extending forward over 4 costal folds, vomerine teeth in series of 8.

Description: Type; 20 costal grooves, 12 costal folds between appressed toes; head oval; head width 7 2/3 in length from snout to vent; head length 5 1/3 in length of body; eye longer than its distance from tip to snout; outline of upper jaw convex as seen from side; angle of jaw back of hind angle of eye; both eyelids fitting under a fold of skin behind; a groove from eye to gular fold; limbs weak; fingers 3, 2, 4, 1 in order of length, 1 not free from 2; toes 3, 2, 4, 1 in order of length, 1 not free from 2; tail longer than head and body, cylindrical in cross-section, scarcely tapering, ending in a blunt point; anal lips smooth; vomerine series not confluent with parasphenoids, 8 teeth in series, beginning behind inner border of nares, extending nearly straight back and a little in, separated from fellow by width of nares and from parasphenoids by same distance; latter in a single patch, divided behind, beginning opposite middle of eyesocket; blackish above, light whitish gray below postocular groove and a line above insertions of legs; tail dark on dorsal surface, sides and below light. Total length 101 mm., head 9, body 38, tail 54.

Remarks: While this animal is very close to *B. major* it has less brown in color; darker dorsum and lighter venter; a more distinct demarcation between color of upper and lower surfaces; vomerine teeth in a series instead of a patch and directed much more

backward. (*B. major* has the vomerine teeth in an irregular, nearly transverse patch.) Van Denburgh and Slevin (1914) mention 60 specimens, 55 of which were collected on East Coronado. Out of 38 specimens 36 had 18 costal grooves and 2 had 16.

Batrachoseps catalinae sp. n.

1905 *Batrachoseps attenuatus* Van Denburgh, Proc. Cal. Acad. Sci., (3), IV, p. 16; Van Denburgh and Slevin 1914, l. c., (4) IV, p. 137.

Type: U. S. Nat. Mus. No. 57335, adult female.

Type locality: Santa Catalina Island.

Diagnosis: A *Batrachoseps* with darker dorsal surface and lighter sides, 19 to 21 costal grooves, hind leg extending over 4 costal folds, vomerine teeth in irregular patch, first finger and toe very reduced.

Description: Type; 21 costal grooves; 12 costal folds between appressed toes; head oval; head width 7 1/4 in length from snout to vent; head length 4 1/3 in length of body; eye longer than its distance from tip of snout; outline of upper jaw concave as seen from side; angle of jaw back of hind angle of eye; both eyelids fitting under a fold of skin behind; a groove from eye to gular fold; limbs weak; fingers 3, 2, 4, 1 in order of length, 1 fused to 2, scarcely distinguishable; toes 3, 2, 4, 1 in order of length, 1 fused to 2, scarcely distinguishable; tail longer than head and body, cylindrical in cross-section, tapering to a point; Vomerine teeth in two patches, beginning behind inner border of nares, extending in and back, separated from fellow by width of nares, and from parasphenoids by twice that distance; latter in two patches incompletely separated, beginning opposite middle of eyesocket; dark purplish above, fading gradually into dull brownish below; no distinct line of demarcation. Total length, 121 mm., head 10, body 43, tail 68.

Variations: Four specimens show no important variations. In U. S. Nat. Mus. Nos. 57334, 57336,

38362 the vomerine series are separated from the parasphenoids by a greater distance than in the type, namely by the length of the vomerine patch. Also in these three specimens the parasphenoids are in two quite separate patches.

	Total length	head	body	tail	sex
57334	97	9	38	50	female
57336	80	7.5	28.5	44	young
38361	103	8	35	60	young
38362	96	7.5	33.5	55	young

Remarks: This species is close to *B. major,* the coloration is quite similar, but the small size of the animal, the reduced first finger and first toe, and the larger number of costal grooves are sufficient to indicate a recognizable form.

Van Denburgh (1905) says; "A single specimen collected at Avalon, Santa Catalina Island, by Mr. A. M. Drake (Cal. Acad. Sci. No. 3726) seems indistinguishable from the mainland species. It has nineteen costal grooves, slender limbs, and narrow head. The coloration is uniform slaty brown above, paler below. Three specimens secured on this island by Mr. Fuchs differ from this one only in the slightly paler coloration."

Neither of these species are at all similar in color to *B. attenuatus,* which has a light dorsal band and dark sides, thus quite reversing the color scheme of *major, leucopus,* and *catalinae.*

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HERPETOLOGICAL NOTES FROM NORTH CAROLINA—II.

Plethodon cinereus, taken in some numbers about twelve miles from Raleigh, on a high steep slope on the south side of Crabtree Creek, overgrown with

Kalmia and Rhododendron. Both the redbacked and unicolorous forms were secured. This is the second record from the state east of the mountains.

Pseudotriton montanus. Two small ones taken at Aberdeen (Moore county) on April 14, 1922. I have known the species at Raleigh to disgorge when caught specimens of smaller salamanders, such as *Eurycea bislineata.* As a further clue to its habits I may add that two small adults were kept in an aquarium for about three months, and were as much at home in and under the water as newts, altho specimens of *Eurycea guttolineata* and *Desmognathus fusca* drowned in a day or so.

Pityophis melanoleucus (Pine Snake). Two dead ones seen in the roads at different places near Aberdeen on April 21, 1922 by Mr. Sherman, and the head of one preserved. Each was about five feet long.

Micrurus fulvius (Coral Snake). We now have three records from Sanatorium (Hoke County), and one each from Southern Pines (Moore Co.), Old Topsail Inlet (Pender Co.) and Wilmington (New Hanover Co.), all of specimens sent to the State Museum or seen by the curator, H. H. Brimley.

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